PART 2
RELEVANT ECOLOGICAL IMPACTS

Habitat and other impacts to populations of endangered and threatened species can have an effect on the size or viability of these populations. Habitat availability is often a limiting factor for endangered and threatened species and the short- or long-term loss of suitable habitat can contribute to the decline of the populations. Plant species occurrence can depend upon local soil conditions within the species range.

The following describes habitats in the proposed project area that are significant to the endangered and threatened species discussed in this biological assessment and which may be affected by construction and/or operation of the railroad.

2.1 GRASSLANDS

2.1.1 Minnesota

Common vegetative species in southern Minnesota include big bluestem (*Andropogon gerardii*), Indian grass (*Sorghastrum nutans*) and prairie dropseed (*Sporobolus heterolopis*). Minnesota natural vegetation originally consisted of northern coniferous forest, eastern deciduous forest and tall grass prairie. However, most of these areas were cleared for agriculture and today less than 1 percent of tall grass prairie exists. The proposed project passes through approximately 66 miles of pastureland, 200 miles of cropland and over 130 miles of woody vegetation (MDNR 1999).

2.1.2 South Dakota

Mixed grass prairie communities exist west of the Missouri River in South Dakota. These communities are made up of wheatgrass (*Elymus* spp.), needle grass (*Stipa* spp.), blue grama (*Bouteloua gracilis*), buffalo grass (*Buchloe* spp.) and little bluestem (*Schizachyrium scoparium*). Central South Dakota, from the Missouri River to the James River, is a transition zone between the drier western prairie and the wetter eastern part of the state. Common plant species include wheatgrass, little bluestem and needle grass. Plant communities found in eastern South Dakota include Indian grass and switchgrass (*Panicum virgatum*). The extreme eastern part of the project area is located within the historic range of the tall-grass prairie; however, this area is now mostly agriculture (McGregor et al. 1986).

2.1.3 Wyoming

The Powder River Basin can be characterized as a vast grasslands area, despite large expanses of sagebrush. Grasslands may be defined as areas with less than 50% sagebrush cover. Shrubland is defined as areas of greater than 50% sagebrush cover (Zeimans and Walker 1977). Most of these communities are currently used as rangeland.

Grasslands provide habitat for numerous species such as mountain plovers, swift fox, and black-footed ferrets. Even though some areas of grasslands in the Great Plains have been plowed for winter wheat production, large tracts of grass and shrub-dominated vegetation remain.

Mixed grass prairie communities are located in eastern Wyoming. Blue grama and buffalo grass dominate short-grass prairie. Mixed grass prairies can be divided into several types, but are all characterized by needle-and-thread grass (*Hesperostipa comata*), western wheatgrass (*Agropyron smithii*), threadleaf sedge (*Carex filifolia*), needleleaf sedge (*Salix interior*), junegrass (*Koeleria* spp.), Indian rice grass (*Oryzopsis hymenoides*), prickly pear cactus (*Opunita polyacantha*), scarlet globe mallow (*Sphaeralcea coccinea*), fringed sagewort (*Artemisia* spp.), and various species of milkvetch (*Astragalus* spp.) and locoweed (*Oxytrapis lambertii*). Mixed-grass prairies in the foothills are typically dominated by bluebunch wheatgrass (*Agropyron spicatum*) and sideoats grama (*Bouteloua curtipendual*).

On sandy soils, prairie sandreed (*Calamovilfa longifolia*), sand dropseed (*Sporobolus heterolepis*), sand sagebrush (*Artemisia* spp.), and yucca (*Yucca glauca*), may be common. Saline soils lead to an increased abundance of such halophytes as alkali sacaton (*Puccinellia airoides*), four-wing saltbush (*Atriplex canescens*), greasewood (*Sarcobatus vermiculatus*), and inland saltgrass (*Distichylis stricta*) (Zeimans and Walker 1977).

In addition to short- and mixed-grass prairie, there are also small tracts of tall-grass prairie on sandy soils or along streams. Common tall-grass prairie species include big bluestem, Indian grass, prairie dropseed, sideoats grama, and switchgrass (McGregor et al. 1986).

2.2 WOODLANDS

2.2.1 Minnesota

Southeastern, central and parts of western Minnesota contain deciduous forests, including the Maple-Basswood Forest, Oak Forest, and Lowland Hardwood Forest. The Maple-Basswood Forest is common from southeastern to west central Minnesota. Basswood (*Tilia americana*) and sugar maple (*Acer saccharum*) are common canopy species in this forest community. The Oak Forest is most common on dry to dry-mesic sites. Northern pin oak (*Quercus ellipsoidalis*) and white oak (*Quercus velutina*) dominate this forest. The Lowland Hardwood Forest communities can be found in areas of abundant soil moisture. Most are located along floodplains. Common Lowland Hardwood Forest species include silver maple (*Acer saccharinum*), cottonwood (*Populus deltoides*), and elm (*Ulmus* spp.) (MDNR 1999).

2.2.2 South Dakota

On the eastern edge of the proposed project area closer to the Black Hills, scattered woodlands of ponderosa pine (*Pinus ponderosa*), limber pine (*Pinus flexilis*), and juniper (*Juniperus* spp.) occur on outcrops of sandstone, limestone, scoria and shale bedrock resistant to grass growth.

2.2.3 Wyoming

The woodlands that exist in eastern Wyoming consist of ponderosa pine and occur on outcrops of sandstone and shale. Pine grows in many places throughout the Powder River Basin. In most cases, the trees will be scattered on the ridgetops only, with the sloping hillsides being covered with juniper and grass or sagebrush. Ponderosa pine is the major species, although some areas do contain limber pine. Shrubs contained in the understory are skunkbush sumac (*Rhus trilobata*), creeping juniper (*Juniperus horizontalis*), rocky mountain juniper (*Juniperus scopulorum*), and western snowberry (*Symphoricarpos occidentalis*) (Zeimans and Walker 1977).

The herbaceous layer is mostly grasses such as green needlegrass (*Stipa viridula*), sandberg bluegrass (*Poa secunda*), prairie junegrass (*Koeleria cristata*), stoney hills muhly (*Muhlenbergia cuspidata*), or side oats grama. Sites with coarser soils will contain bluebunch wheatgrass, little bluestem (*Andropogon scoparius*), or porcupine needlegrass (*Stipa spartea*). Silver sage (*Artemesia cana*) may also be present (Zeimans and Walker 1977).

2.3 RIPARIAN AREAS

2.3.1 Minnesota

The rivers in the proposed project area include the Mississippi, South Fork Whitewater, Zumbro, Straight, Minnesota, Blue Earth, Little Cottonwood, and Cottonwood. Floodplain forests occur within the floodplains of the major rivers and are well developed on floodplains in the Mississippi and Minnesota rivers. The Silver Maple Subtype, a type of floodplain forest, occurs mainly in the deciduous forest-woodland zone along the Minnesota and lower Mississippi rivers. Silver maples (*Acer saccharinum*) dominate the tree canopy in this subtype, and are present in the subcanopy and shrub layer as well. Green ash (*Fraxinus pennsylvanica*), cottonwood, and American elm (*Ulmus americana*) are often present in the canopy, but are most common as seedlings and saplings. The understory of the Silver Maple Subtype is

open, with less than 25% cover by tree seedlings and saplings. Herbs in the nettle family, including wood nettle (*Laportea canadensis*) and clearweed (*Pilea pumila*), dominate the groundlayer. Woody and herbaceous climbers are common, especially wild grape (*Vitis riparia*), wild cucumber (*Echinocystis lobata*), burcucumber (*Sicyos angulatus*), groundnut (*Apios americana*) and hog-peanut (*Amphicarpa bracteata*). In southern Minnesota, silver maple, black willow (*Salix nigra*), and cottonwoods are common canopy dominants. Scattered individuals or patches of river birch (*Betula nigra*), American elm, slippery elm (*Ulmus rubra*), green ash (*Fraxinus pennsylvanica*) and swamp white oak (*Quercus alba*) are also common in stands in southern Minnesota (MNHP 1993).

2.3.2 South Dakota

There are several floodplains in the proposed project area associated with the Cheyenne, Belle Fourche, and Missouri rivers. Riparian shrub and forest areas occur along floodplains of each of these larger rivers. Common species include cottonwood and willow (*Salix* spp.). Eventually, with succession due to dam control these forests will change to green ash with choke-cherry (*Prunus virginiana*) and silver buffalo berry (*Shepherdia argentea*) as understory. Sand and gravel bars located in the rivers and streams provide excellent sites for the establishment of cottonwoods and various species of willow.

2.3.3 Wyoming

Riparian communities in Wyoming are generally restricted to floodplains. The floodplains are typically arranged in terraces where former floodplains have become elevated because of stream downcutting and deposition. Terraces rarely flood and instead create an environment that can be transitional between the riparian and upland landscapes. Salt accumulation is often higher on terraces than in the floodplain. Consequently, halophytes, such as greasewood, typically occur on terraces, whereas the less salt-tolerant silver sage and Wyoming big sagebrush (*Artemisia tridentata*) occur in the lower floodplain that receives more water. Riparian areas provide habitat for wintering and nesting raptors and nesting areas for shorebirds such as least terns and piping plovers. In these riparian landscapes, meandering of the channel is typical except where rivers have cut canyons through the landscape or where steeper gradients lead to the formation of braided streams (Zeimans and Walker 1977).

Riparian forest vegetation occupies lower stream terraces and point bars as well as sandy islands within stream channels. It includes plains cottonwood trees (*Populus sargenti*), sandbar willow (*Salix interior*) and peach-leaf willow. Shrubby riparian habitats are usually dominated by willows and sedges. They are most often distributed along streams and near seeps (Zeimans and Walker 1977).

This zone is delineated as far as possible on the accompanying map. The presence of cottonwoods was the prime determinant for mapping purposes, but it should be kept in mind that the lush bottomland grasses, without cottonwoods, would extend up the small intermittent drainages. The presence of cottonwood signals a definite streamside community even if water is not flowing on the surface for most of the year. Three cottonwood species grow in the Powder River Basin: Plains cottonwood, narrow leafed cottonwood (*Populus angustifolia*), and lance leafed cottonwood (*Populus acuminata*). Under the cottonwoods, rocky mountain juniper may grow. Another more infrequent member of the community is the boxelder (Zeimans and Walker 1977).

Also along the stream channel grow willows such as the peach leafed willow (*Salix amygdalcides*), sandbar willow, and coyote willow (*Salix exigua*). The understory can be quite dense and complex containing such species as wild rose, chokecherry, sand cherry (*Prunus pumila*), bearberry (*Arctostaphylos uva-ursi*), currents (*Ribes* spp.) and other fruiting trees and bushes (Zeimans and Walker 1977).

Stream channel grasses tend to be taller and more lush than those on the surrounding hills. They include prairie cordgrass (*Spartina pectinata*), tufted hairgrass (*Deschampsia caespitosia*), basin wildrye (*Elymus*

cinereus) and Canada wildrye (*E. canadensis*), slender wheatgrass (*Agropyron trachycaulum*), bearded wheatgrass (*Agropyron caninum*), western wheatgrass, inland sedge (*Carex interior*), and mat muhly (*Muhlenbergia richardsonis*). Some forbes present are licorice (*Glycyrrhiza* spp.), aster (*Aster* spp.), golden pea (*Thermopsis* spp.), starwart (*Stellaria* spp.), virginsbower (*Clematis* spp.) and yarrow (*Achillea* spp.) (Zeimans and Walker 1977).

2.4 WETLANDS

There are several types of wetlands typically associated with the geographic region that the proposed project area traverses. These include palustrine, lacustrine, and riverine wetlands. Palustrine wetlands have emergent vegetation like cattails and bulrushes, or less aquatic plants such as smartweed (*Polygonum* spp.) and spikerush. Lacustrine systems include artificial impoundments or reservoirs, where riverine systems include rivers and streams. Semipermanently and permanently flooded palustrine and riverine wetlands are also associated with river drainages throughout the proposed project area.

Wetlands provide several environmental benefits within the proposed project area. Environmentally, wetlands provide important breeding and resting habitat for neotropical migrants and waterfowl, habitat for fish and amphibians, retention of flood flows and water purification. About 90% of wildlife use wetlands daily for water, cover, or foraging. Additionally, plants such as Ute ladies'-tresses orchid (*Spiranthes diluvialis*) are limited to very specific wetland areas as discussed in Section 3.12 of Part 3.

2.4.1 Minnesota

Southern and Western Minnesota contain the Prairie Pothole Region. Prairie potholes are shallow, water-holding depressions of glacial origin (Sloan 1972). These wetlands have great variability in size, depth and water permanence (Sloan 1972, Stewart and Kantrud 1972). The potholes range from seasonally flooded basins that hold water for only a few weeks to wet prairies, marshes, and permanent water. These temporary water holding basins frequently have an abundance of plant seeds and invertebrates, which makes them ideal feeding and resting areas for migrating waterfowl and shorebirds.

The dominant emergent species in Minnesota wetlands are usually graminoids such as cattails (*Typha* spp.), common reed grass (*Phragmites australis*), bulrushes (*Scirpus* spp.), rushes (*Juncus* spp.), spike rushes (*Eleocharis* spp.), and some umbrella sedges (*Cyperus* spp.) (MNHP 1993).

2.4.2 South Dakota

Seepage associated with distribution and application of irrigation water has increased wetland acreage, especially on the Bureau of Reclamation (BOR) irrigation projects in western South Dakota (primarily Belle Fourche and Angostura Reservoirs). In many parts of South Dakota, flowing artesian wells modified for livestock watering or fish production have increased wetland areas. In the unglaciated western part of South Dakota, stock ponds and dugouts constructed for livestock watering constitute an important part of area wetlands. About 60% of the wetlands in western South Dakota occur in association with stock ponds (McGregor et al. 1986).

2.4.3 Wyoming

Wet meadow vegetation occupies the lowest terrace level along stream channels as well as areas along vegetated channel banks. Wet meadow vegetation occurs along all sections of Antelope Creek and along major tributaries. This type of vegetation generally lacks an overstory of trees or shrubs, and forb and grass species dominate. Species include sedges, Baltic rush (*Juncus* spp.), alkali bluegrass (*Poa juncifolia*), prairie cordgrass (*Spartina pectinata*), saltgrass (*Distichylis stricta*), spikerush (*Eleocharis* spp.), and smooth scouring rush (*Juncus* spp.). The wetter meadows have shrub components consisting of willow (*Salix* spp.), and some of the drier meadows have a sagebrush (*Artemisia* spp.) component (Zeimans and Walker 1977).

2.5 SOILS

2.5.1 Minnesota

Soils in Minnesota have formed in loess and underlying glacial till. These soils are extremely fertile and productive. They can be classified into three taxonomic orders; 1) entisols, 2) alfisols, and 3) mollisols. Entisols are found in underdeveloped landscapes such as alluvial basins and steep slopes. Surface texture is mainly silt loam. Alfisols are found in upland areas of nearly level to moderately steep slopes. Organic matter is present in surface horizons. Surface texture is silt loam. Mollisols are similar to alfisols, but with larger accumulation of organic matter. Surface texture is silt loam.

2.5.2 South Dakota

The most productive soils in South Dakota are chernozems (black earth soils), which cover most of the state east of the Missouri River. These soils are rich in humus. Soils in western South Dakota are formed from weathering of sedimentary rocks. Soils in this region are classified as 1) entisols, 2) alfisols, 3) mollisols and; 4) aridisols. Aridisols are found on slopes and are formed from weathered shale. Some riparian zones have relatively stable soil profiles because the creek or river is at the bottom of a V-shaped valley incised in bedrock. In contrast, riparian mosaics on the alluvial soils of broad floodplains change rapidly due to disturbance by flooding. Additionally, freshly deposited alluvium along the channels of meandering streams form sandbars, usually composed of sand or gravel (Glass 1993, Blackstone 1988).

2.5.3 Wyoming

The soils of the Powder River Basin are typical, semiarid grassland soils found throughout the Western United States. Organic material is slow to accumulate due to the climate and vegetative conditions. The soils are residual in nature (ie: developed in place) and most were formed from weathered sandstone and shale bedrock materials. Alluvial soils are also present and are developed along stream bottoms from material derived from highland areas and deposited along the streams. These alluvial soils usually contain a fair amount of organic matter (Atlantic 1976a:14). The soils in the proposed project area are generally shallow and not well developed because of an abundance of erodible soil types, and a dry, relatively cool environment that slows soil development. Soils that are deeper occur at the lower topographic elevations in the proposed project area because of more rapid soil development or downslope sediment accumulation.